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ABSTRACT

The proposed New York State Cost of Education Index would be a statistical measure of the price changes in the goods and services purchased by local districts. Data would be available on a regional basis. Many statistical procedures and theoretical considerations involved in constructing such an index are similar to those used for the Consumer Price Index. Criteria for an effective index include practicability, availability of data, objectivity, simplicity, and flexibility. The Laspeyre formula is probably the most appropriate statistical formula for constructing the index. Several steps are involved in construction of the New York index. First, the items composing the educational market basket must be identified. A representative sample of school districts should be queried. Items must then be cost weighted and surrogate measures must be collected for them. Items must be statistically combined into primary indexes, submajor indexes, major indexes, and finally, the regional cost of education index. To design and develop such an index would be costly. Presently, neither valid educational cost data nor representative educational price data are being collected. Much care should be exercised in the uses of the index since using it to adjust state aid would probably give more aid to wealthier districts and thus run counter to the principle of equal educational opportunity. (Author/JM)

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STUDY # 5

# AN ANALYSIS AND EVALUATION OF REGIONAL COST OF EDUCATION INDEXES FOR NEW YORK STATE

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# AN ANALYSIS AND EVALUATION OF REGIONAL COST OF EDUCATION INDEXES FOR NEW YORK STATE

## INTRODUCTION

Several States[1] have considered utilizing a Cost of Education Index to adjust the foundation level of State aid programs. Index numbers and their use in education have been a subject of interest for more than a century.[2] Ayres, one of the earliest pioneers, was interested in the construction of index numbers for "measuring the status of the public school systems of the States."[3] Norton published a study based on the "market basket" approach, combining capital (construction costs) and current

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1 See, for example, the following studies:

Orlando F. Furno, Proposed Nevada Education Price Index, A Study submitted to the Subcommittee of School Finance of the Nevada Legislature, Nevada, September 2, 1964.

Donald V. Johnson, "A Cost of Education Index for the Public Schools of Indiana," Unpublished Ph.D. Thesis, Department of Education, Indiana University, 1962.

Vernon G. Grant, "A Cost of Education Index for Utah Publich School Districts," Unpublished Ph.D. Thesis, Department of Education, Utah University, 1961.

2 Leonard P. Ayres, An Index Number for State School Systems, New York: Russell Sage Foundation, 1920.

3 John K. Norton, Why Schools Cost More, Research Bulletin No. 3, Vol. XVI, National Education Association, Washington, 1938.

expenditures in what was an educational price index. Paul R. Mort encouraged Lorne H. Woollatt[4] to develop a cost of education index, "...in order to adjust certain financial estimates in the apportioning of the State foundation program."

In the last twenty years, a number of other studies were completed utilizing the statiscal approaches of pioneers in the field of index numbers such as Fisher,[5] Mitchell,[6] and Mudgett.[7] There were other studies such as those done by Furno,[8] Boyle,[9] Carter,[10] and Wasserman.[11] These studies developed indexes based

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4 Lorne H. Woollatt, Development of a Cost of Education Index, Staff Study Number 1, 1953 Review of Fiscal Policy for Public Education in New York State, New York State Educational Conference Board, Paul R. Mort, Director, 1953.

5 Irving Fisher, The Making of Index Numbers, New York: Houghton Mifflin Co., 1922.

6 Wesley C. Mitchell, The Making and Using of Index Numbers, Bureau of Labor Statistics, Bulletin No. 656, 1938.

7 Bruce I. Mudgett, Index Numbers, New York: John Wiley and Sons, Inc., 1951.

8 Orlando F. Furno, "The Cost of Education Index," School Management, January issues from 1960 to 1974 inclusive.

9 Gerald J. Boyle, "The Cost of Education Index," Educational Finance Research Section, New York State Education Department, September 1959.

10 Thomas D. Carter, "The Development of a Procedure for Computing a Cost of Education Index for the Public Schools of the State of Texas," Unpublished Ph.D. Thesis, Department of Education, University of Texas, 1966.

11 William Wasserman, Education Price and Quantity Indexes, Syracuse University Press, Syracuse, New York 1963.

primarily on the formulas utilized in developing the Consumer Price Index.[12] In general, no special account of the economic theories[13] and subsequent court decisions[14] regarding the financing of public education was considered. Present developments in educational price indexes are concerned with (1) the economics of education, including the concept of rates of return on educational investments;[15] (2) the relationship between expenditure levels (cost per pupil) and school quality;[16] (3) the relationship between expenditure level and educational opportunity; (4) the adjustment of State aid to account for regional differences in the purchases of educational goods and services. Much of the empirical work has been associated with the honing of statistical methods and procedures, a development made possible by the advent of the computer. The work in developing educational price indexes is still hampered not by being able to record and

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12 See The Consumer Price Index A Short Description, Bureau of Labor Statistics, 1971.

13 Melville Ulmer, The Economic Theory of Cost of Living Index Numbers, New York: Columbia University Press, 1949.

14 These court cases started with the California Serrano v. Priest case and continue to the present. New York State is presently involved in a suit popularly called the "Levittown Case."

15 E.E. Loveless, "Return Expected on Investments in Education," The Catholic Educational Review, LXV, October, 1967.

16 Finis Welch, "Measurement of the Quality of Schooling," American Economic Review, LVI, May, 1966.

process a large volume of data but by the lack of securing reliable, valid school district expenditure data and as importantly by the lack of and the cost to secure localized or regional price data on an assured, continuing basis.

## PURPOSE OF THIS STUDY

New York State does not presently compute a Cost of Education Index, particularly on a county or regional basis. Therefore, New York State cannot adjust its State aid to local districts in terms of regional price variations to deliver the same quantity of educational goods and services at the local school district level. In a Project 842 working paper[17] entitled "The Effect of Regional Price Adjustments for State Aid to Local School Districts," an attempt was made to adjust State aid per pupil through utilization of regional Consumer Price Indexes for the New York Standard Metropolitan Statistical Area (used for downstate districts) and the Buffalo Standard Metropolitan Statistical Area (used for upstate districts). This procedure, of course, adjusted State aid in terms of a "cost-of-living market basket" rather than a "cost of educational goods and services market basket." It should be noted that an educational market basket is not identical to a family market basket. The differences in State aid adjustments between upstate and downstate districts amounted to about seven percent.

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17 See "The Effect of Regional Price Adjustments for State Aid to Local School Districts", mimeographed paper, New York State Education Department, April 1978. (Appendix A)

Aside from the problems inherent in substituting a family market basket for an educational market basket, adjusting State aid for regional price variations has several other drawbacks. First, to adjust State aid for regional price variation is expensive to the State. Utilizing the procedure discussed in the previous paragraphs would add an additional $82 to $85 million dollars to the cost of State aid, depending upon the State aid plan selected. More importantly, however, is the fact that the regional price adjustments to State aid would provide larger State aid increases to the very districts which have the highest expenditure levels and staffing ratios. The regional price adjustment to State aid would not result in narrowing the expenditure level gap and staffing ratio gap between wealthy and poor school districts in New York State. Whether or not, the regional price adjustments to State aid would equalize expenditure levels in terms of the educational goods and services being purchased by school districts remains a moot point for further, detailed study.

Presently, then, without further detailed study on these matters, there appears to be few valid reasons for immediately implementing regional price differentials to adjust State Aid in New York State at this time. While some area differences in cost of living are known, differences in prices paid for educational goods and services are not. No plans are presently in store either to collect valid educational prices nor to have local school districts record in sufficient detail the expenditures actually made for the various educational goods and services

bought. For these reasons, it is the purpose of this study memo to outline what would be involved to construct a New York State Regional Cost of Education Index. The object will not be to actually develop this Index.

## THE DESIGN AND DEVELOPMENT FOR A NEW YORK STATE REGIONAL COST OF EDUCATION INDEX

The New York State Regional Cost of Education Index is explained in its design and development in terms of the Consumer Price Index.[18] The Consumer Price Index is a statistical measure of changes in the prices of goods and services bought by urban wage earners and clerical workers. The CPI covers the prices of goods and services which persons buy for living: food, clothing, automobiles, homes, household furnishings, fuels, drugs, fees to doctors and lawyers, beauty shops, rent, repair costs, transportation, television, recreation, radios, etc.

Like the Consumer Price Index, the New York State Regional Cost of Education Index would be a statistical measure of the prices in goods and services actually purchased by local boards of education. For the Consumer Price Index, Bureau of Labor Statistics personnel price over 400 different types of goods and services in major metropolitan areas throughout the United States. Likewise, the New York State Regional Cost of Education

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[18] This index is often called the "Cost of Living Index." Its offical name is the Consumer Price Index for Urban Wage Earners and Clerical Workers. A new Consumer Price Index for all Urban Consumers has been developed and is being published, also.

Index would cover prices for all the goods and services bought by local school districts. Such services would be reported in major categories such as Instruction, Administration, Attendance, Health, Student Body Activities, Pupil Personnel, Plant Operation, Plant Maintenance, Pupil Transportation, School Construction, etc. Some goods and services purchased by local school boards would be recorded under the rubrics of instructional materials and supplies (books, paper, pencils, etc.); equipment (projectors, lables, chairs, buses, trucks, language labs, desks, etc.); land; fringe benefits (pensions, social security, health care, etc.).

Importantly, this approach to the construction of an index measures the changes in the price levels of goods and services actually bought by school districts. This statistical design for the construction of the New York State Regional Cost of Education Index does not measure a level or standard of education quality, no matter how desirable or needed this might be.

Base Reference Period of Index. The Consumer Price Index measures price changes from a designated reference period. The Cost of Education Index will also measure price changes from a designated reference period. Should different designated reference periods by desired, Consumer Price Index numbers are published monthly and averaged yearly and therefore can be converted to any desired base period. Thus, an index of 110 means that there was a 10 percent increase in prices since the base period. The New York State Regional Cost of Education Index could be interpreted likewise. Movements of the Index from one date to another can be expressed as percent changes rather than changes

in index points, because index points are affected by the base reference period selected while percent changes are not.

## THE EDUCATIONAL MARKET BASKET FOR THE NEW YORK STATE REGIONAL COST OF EDUCATION INDEX

It was indicated earlier that the Consumer Price Index covered all items that consumers buy. Taken all together these goods and services make up what is known as a "market basket." It is not necessary nor is it feabile to obtain price quotations on everything that consumers buy in order to calculate a valid index of change in consumer prices. Such an approach would be too time consuming or inordinately expensive. If this approach were taken the monies needed to do the job and the persons required would probably not be made available.

Consumer Market Basket. For the reasons indicated in the preceeding paragraph, only about 400 items have been selected to comprise today's present "market basket" for the Consumer Price Index. These items represent a list of the most important goods and services and a sample of the less important ones. In combination, these items represent all items purchased. The content of the Consumer Price Index market basket in terms of items, quantities, and qualities is kept essentially unchanged. Thus, in the index calculations between major revisions, any movement of the index from one month to the next is due solely to changes in prices. A comparison of the market basket from one period to the next period yeilds the measure of average price change.

Educational Market Basket. As with a consumer market basket, constructing an educational market basket also requires following the cost history of educational goods and service that are relatively constant. The school board is considered the "purchaser" of the services of classroom teachers, guidance workers, administrators, custodians, and clerks, and also of instructional materials and equipment. The amount and quality of these educational goods and services would remain relatively constant over a period of time; but the prices paid for these goods and services would not. Specific items which can be identified from amoung the many possible plant costs should be collected. These items should be defined so that realistic units of measurements can be used. The million-and-one cost variables whose contributions to the school budget are negligible should be eliminated or selectively sampled.

The foremost question which must be answered regarding the market basket approach to index making are: (1) Have the amount or quantity and the quality of the educational goods and services purchased remained constant? and (2) What is the cost of this educational market basket from one year to the next for school districts in various parts of New York State?

Before discussing the statistical techniques which should be used to construct a reliable, valid New York State Regional Cost of Education Index, the uses to which the Index could be put and the criteria for constructing the Index should be discussed.

## USES OF THE INDEX

The Consumer Price Index has been used widely by the general public to guide family budgeting and to understand what has been happening to family finances. Increases in teacher's salaries have been negotiated in terms of the Consumer Price Index. Labor-management contracts have utilized the Consumer Price Index to adjust wage levels for cost of living increases. The Consumer Price Index has also been used for such diverse purposes as adjusting royalties, pensions, welfare payments, and on occasions for adjusting alimony payments. Also the Consumer Price Index has been used as an indicator of trends in inflation and deflation in the national economy.

The New York State Regional Cost of Education Index could also have many uses. A number of these practical uses are listed below:

1. Adjust State aid payments to various school districts in accordance with regional adjustments.
2. Compare a district's over-all costs with those in the same region and same size group.
3. Compare a district's expenditures for specific items.
4. Discover areas in which a district may appear to be over-expending or under-expending and help a district explain the reasons.
5. Prepare a budget for the next year that will present a balanced pattern of expenditures, so that no one area of school costs is unduly favored.
6. Compare and evaluate the effort patterns and staffing for the education of their children.

7. Compare expenditures, spending patterns and staffing ratios with districts across the State whose over-all expenditures closely match a district.

Of course, there could be other uses to which a New York State Regional Cost of Education Index could be put. Although the development of an Index involves the massive accumulation of facts and figures, an Index can be a dynamic tool in the hands of creative, innovative local school personnel.

## CRITERIA FOR EVALUATION THE DEVELOPMENT OF EFFECTIVE INDEXES

The validity of an effective Regional Cost of Education Index should be judged on the bases of both theoretical and pragmatic principles. In regard to the use of index numbers, a substantial amount of theory exists. What needs more conclusive proof is that the development of an educational price index can fit into a valid economic theory. The theorectical basis for the statistical or mathematical construct of an index will be discussed in a later section. Only the criteria for evaluating the effectiveness of an educational price index are discussed here. The following criteria seem to have the general approval of most researchers[19] who have discussed and actually constructed indexes:

1. PRACTICABILITY: The time and money required to produce and maintain the index should be commensurate with the result.

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19 See Orland F. Furno, "A Statistical Look at The Cost of Education Index," School Management, V, January 1961, p. 140.

2. AVAILABILITY OF DATA: All data used in the index should be readily and easily available.

3. OBJECTIVITY: All data entering into the index should be uniform, accurate, and objective to whatever degree is necessary for yielding one correct answer to any person who calculates the index.

4. SIMPLICITY: The index should be constructed in the simplest terms consistent with validity and objectivity.

5. FLEXIBILITY: Since the index would represent all local school districts and not necessarily a particular local school district, it ought to be so flexible that individual districts or groups of districts (regions) could substitute their data into the data for the national components.

## CONSTRUCTION OF THE NEW YORK STATE REGIONAL COST OF EDUCATION INDEX

The construction of a valid educational price index involves the collection of price data, the selection of surrogate measures to act as price deflators, the assignment of weights to the surrogate measures, the statistical procedures to link prices and combine weights. The procedures utilized to construct a reliable, valid New York State Regional Cost of Education Index are discussed in the subsequent paragraphs.

### Price Data Collection

In the Consumer Price Index, prices are obtained by personal visits to a representative sample of 18,000 retail stores and shops. In the 1974 Point-of-Purchase survey, approximately 23,000 families were asked where they purchased various types of goods and services.

The Point-of-Purchase survey was conducted to select for each index population a representative sample of retail stores, mail houses, bowling alleys, doctor's offices, and other places where goods and service were bought. To ensure that the Index relfected only changes in prices and not changes in quantity or quality, detailed specifications were used to describe the items comprising the CPI market basket. Under the 1978 revision, an improved process called "disaggregation" was designed for selecting the detailed items to be priced. In the previous process, BLS pricing agents were given detailed descriptions of items to be priced, but presently agents have more general descriptions of the item to be chosen. In the total market basket, all high-volume items are represented in proportion to their share of total expenditures. The range of items typically purchased now is more representative than it was under previous selection processes. The Bureau uses mail questionnaires to obtain some of the needed price data such as newspaper prices, utility rates, bus fares, etc. For a number of other items such as home purchase, college tuition, used cars, magazines, etc., data collected by other government agencies or private organizations are used.

For New York State to collect separate prices on the goods and services purchased by local school district boards of education would be exceedingly expensive. The cost could very well exceed the amount the State would be willing to provide for adjusting State aid payments. Moreover, unless educational prices paid for goods and services are collected on a regularly,

monthly, or at the least yearly basis the index would not be very valid. Consequently, prices on items in the educational market basket should be obtained exclusively from data collected by State and Federal agencies other than those in education.

Even the data on school expenditures are not collected in the specific detail needed for an educational price index. Some expenditure data for local school districts are on file in the State's Consolidated Data Base. But such data lack the accuracy and specificity of those needed in an educational price index. Therefore, in the design of a New York State Regional Cost of Education Index provisions must be made for periodically (at least every five years) ascertaining the goods and services purchased by local school districts, their prices, and their relative amounts.

Procedural Steps To Be Followed In Constructing An Educational Price Index. Subsequent to the identification of the numerous items which go into the educational market basket, the resolution of the appropriate weights for the main component indexes and their respective sub-indexes must be made. When appropriate weights have been assigned, the next step is to assign valid surrogate measures published on a regular basis by a governmental agency. The third step would be to utilize a base year or series of years against which all indexes should be compared. The fourth step would be to recompute the various indexes on the basis of the selected base years. The fifth step would be to combine the various indexes into a single educational price index. The sixth step would be to deflate

educational costs in terms of the purchasing power of the educational dollar so that all costs are expressed in constant dollars.

## Construction of the Basic Statistical Index Formula

There are numerous index formulas which could be selected as the basic statistical formula for the New York State Regional Cost of Education Index. However, certain formulas yield better statistical results than others. Because the Consumer Price Index is widely known and respected, an explanation of the construction of its basic statistical formula would serve as an excellent setting for a discussion on the statistical formula and procedures for the New York State Regional Cost of Education Index.

In the absence of major weight revisions or market basket sample changes, the Consumer Price Index is most simply expressed as:

$$I_{i:0} = \frac{\Sigma\,(q_0\,p_i)}{\Sigma\,(q_0\,p_0)} \times 100 = \frac{\Sigma\,(q_0\,p_0)\left(\frac{p_i}{p_0}\right)}{\Sigma\,(q_0\,p_0)} \times 100$$

This is the customary, oversimplified way of writing a price index formula to show that the q's are held constant between major revisions. In actual practice, the basic data for weights are values, and the quantity and price elements of the "pq" values (p's and q's) are not separated.

With a weight revisions, the formula becomes:

$$I_{i:o} = \frac{\sum (q_o \, p_{i-s})}{\sum (q_o \, p_o)} \times \frac{\sum (q_a \, p_i')}{\sum (q_a \, p_{i-s}')} \times 100$$

where q is a derived composite of the annual quantities purchased in a weight base period for a bundle of goods and services to be represented by the specific item period.

p are the average prices of the specific commodities or services selected for pricing (the superscript indicates that the average prices are not necessarily derived from identical samples of outlets and specifications over long periods).

i-s is the month preceding a weight revision.

i is the current month.

a is the period of the most recent consumer expenditure survey from which the revised weights were derived.

o is the reference base period of the index.

The $(q_o q_o)$ or $(q_a p_{i-s})$ base "weights" for a given priced item are the average expenditure in a weight base period represented by that item (including expenditures for the item itself and for other similar nonpriced items).

In actual practice, this expenditure is projected forward for each pricing period by the price relative for the priced

item:

$$(q_a\, p_i) = (q_a\, p_{i-1})\left(\frac{p_i}{p_{i-1}}\right)$$

In actual practice, then, the index formula is as follows:

$$I_{i:o} = \frac{\sum(q_o\, p_{i-s})}{\sum(q_o\, p_o)} \times \frac{\sum(q_a\, p'_{i-1})}{\sum(q_a\, p'_{i-s})} \times \frac{\sum(q_a\, p'_{i-1})\left(\frac{p'_i}{p'_{i-1}}\right)}{\sum(q_a\, p'_{a-1})} \times 100$$

Thus, although the cost weight changes with every change in price, the implicity quantity $q_o$ or $q_a$ remains fixed between major weight revisions.

The long-term price relative for each priced item $\left(\frac{p_i}{p_o}\right)$ in reality is:

$$R_{i:o} = \left(\frac{p_1}{p_o}\right) \times \left(\frac{p'_2}{p'_1}\right) \times \left(\frac{p'_3}{p''_2}\right) \cdots\cdots \left(\frac{p''''_i \cdots\cdots}{p'''_{i-1} \cdots\cdots}\right)$$

This is, $R_{i:o}$ is the product of a number of short-term relatives. The superscripts on the p's indicate that these average prices are not necessarily derived from identical samples of outlets and specifications over long periods. This chaining of monthly or quarterly price relatives based on comparible specifications in successive periods allows the requisite flexibility to make substitutions on items, specifications, and outlets.

The Laspeyre statistical formula is probably the best formula suited to achieve the stated purposes of the New York State Regional Cost of Education Index. Ulmer's defense of the use of the Laspeyre formula as the basis of the Consumer Price Index strengthened the arguments to utilize the Laspeyre formula for the New York State Regional Cost of Education Index. The choice of weighted averages of price relatives was based on a number of reasons: (1) price changes and other necessities will cause quantities to change, and price relatives are closer to reality than are fixed-weight aggregates for reckoning this quantity change; (2) the whole index is divided into groups for each of which a sub-index is calculated, making it easier to detect the effect on the index as a whole of a particular sub-index or to detect a change in a single constituent; and (3) this method is better adapted to handling different types of data.

For the purposes of clarity and generalization at this point, some notation should be developed. If, for an item in general, e.g., item i -- the average price in the base period (0) were designated as $P_{oi}$ in period 1 as $P_{1i}$ and so on, the price relative for period 1 could be designated as $\frac{P_{1i}}{P_{oi}}$ (100). As the index was extended to cover more than one year, the price relative was $\frac{P_{ji}}{P_{oi}}$ (100), where j represented any given year. $W_i$ should be the relative weight for item i. This weighting effect, obviously, was to allow each item in the educational market basket to portray its relative importance

in achieving a certain output. Thus each price relative was multiplied by its appropriate weight $W_i$. These products $\frac{P_{ji}}{P_{ol}}(100) W_i$ were summed over all items, and the sum was divided by the sum of the weights. The same approach was to be used to compute educational sub-indexes.

The theory underlying an educational price index was reviewed earlier. The formula recommended was the Laspeyre statistical index formula. The rationale for such selection was also discussed. Data needed to be collected for this study - (1) the price items required in the educational market basket for local school districts and (2) the weighting data - were also discussed.

Criteria for evaluating the effectiveness of an educational price index were enumerated previously, especially those which required that the data (a) fit and describe a valid economic situation and yet (b) not be so complex as to discourage the adoption of an educational price index. Naturally these requirements limited the data which could be incorporated. The data would also be limited by reason of the amount and nature of the governmental statistics which were available. The idea of using public data, especially data issued by agencies of the Federal government, is not unique to educational price indexes. Most of the literature on the subject of price indexes for educational expenditures employed such data. There are a number of good reasons for this, beyond expediency. First, such data are most likely based on well-selected samples. Also, public data possess the very important attribute of availability, and

offer reasonable prospects for continuance in future years. A third reason for the use of nongovernmental prices, according to Gerald J. Boyle,[20] is that data utilized in constructing component indexes be of a surrogative nature; an indirect way of measuring is necessary if self-generating effects are to be avoided.

Wasserman,[21] who was one of the few theoreticians in the field of educational price indexes, was also an advocate of using government published data. But he warned that each particular datum must be examined because even government data are often misleading. He remarked:

> However, the ease in using published government series can be deceptive. Such series must be selected with great discrimination, if misleading results are to be avoided. Verbal similarity in title of a published series and the budgetary of financial designation for a class of school expenditure is no assurance that the published series can be used to represent price movements in this class of expenditures.

## Selection of Appropriate Surrogate Measures For Cost of Education Index

As difficult as the selection of appropriate mathematical formulas for the construction of an educational price index

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[20] Gerald J. Boyle, "The Cost of Educational Index," (Educational Research Section, New York State, September, 1959), p. 7. (Mineographed)

[21] William Wasserman, Education Price and Quantity Indexes (Syracuse: Syracuse University Press, [illegible]), p. 128.

might be, it pales almost into insignificance when compared to the problems of selecting appropriate surrogate measures. First, the price changes for the hundreds of items in the educational market basket must be collected not only on a regular basis but also in as many regions or areas for which comparative prices are desired. Prices may be collected in several different ways. Teams of accountants could visit all the school districts in the State, examine the vouchers in each school district, and make lists of the various prices paid for the various items purchased. Not only would such an approach be prohibitively costly but would also not resolve the problems of quality standards - i.e., are the projectors purchased of comparable quality? Are the library books of comparable quality? Is the Staff for whom salaries are paid of comparable quality? Even if educational prices paid for the various goods and services were to be sampled, the costs to obtain prices would still be high. What the State must weigh in this regard is the question faced by practically all organizations: Are the benefits to be derived worth the costs involved? This may be stated more appropriately in street language: Is the juice worth the squeeze?

One method to overcome the cost problem is to use price changes published by other agencies and organizations, particularly governmental. The source which publishes the prices should have reasonable expectations to continue publishing price changes for years in the future. For example, the Federal Government publishes on a regular basis many price indexes in the publications Survey of Current Business and the Monthly Labor Review.

A possible drawback would be that the prices collected while nationally representative would not be representative of prices for the regions in New York State. Presently, representative educational prices for various regions in New York State are not available. Perhaps, the State Education Department could work in consort with other Federal and State agencies to collect educational prices cooperatively thereby reducing the costs to collect the essential educational prices needed for its regional cost of educational index.

Still the problem of selecting appropriate surrogate measures for the various educational prices remains. The problem is more difficult statistically than the resolution of the cost problem to collect educational prices. The surrogate measures selected to reflect educational prices must not be ones subject to manipulation by those persons responsible for educational purchases. Otherwise, educational prices will be self-driven upwards or self-generating resulting in artificially inflated prices.

Another problem lies in the number of categories into which goods and services purchased will be grouped and prices collected. For example, the Consumer Price Index classifies some 90 different groups of goods and services for which prices are collected and indexes published. Furno[22] in his Cost of Education Index classified educational goods and services into 32

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[22] Orlando F. Furno, "The Cost of Education Index," School Management, January issues from 1960 to 1974 inclusive.

categories and published indexes on each category. Larger numbers of educational price categories would result in a final index more reflective of educational costs. However, the larger numbers of categories would result in increased costs to collect, process, and publish the New York State Regional Cost of Education Index. Expanding the number of different regions would have the same result on costs. Consequently, a balance between acceptable costs to develop the educational price indexes and the number of indexes computed to maintain an acceptable level of validity must be reasoned out. Clearly, costs, validity, and benefits must all be weighed in concert.

### Assignment of Appropriate Index Weights

In the previous section, it was pointed out that an educational price index would have a specified number of separate price indexes each reflective of certain categories of goods and services. From the educational market basket survey, the relative importance of each category of goods and services must be determined. For example, in the Consumer Price Index, each item's importance in family spending is determined. This importance is called the "cost weight" of the market basket item. The same procedure could and should be used to determine the cost weight of each class of educational goods and services priced. Both price and quantity must be taken into consideration.

Separate cost weights are usually combined into a larger,

more meaningful category. For example, in the Consumer Price Index, the cost weights for beef and veal, pork, and other meats are combined into a Meat Index; the cost weights for fuel oil, coal, gas, electricity, and other utilities are combined into a Fuel and Utilities Index. Similarly, the cost weights for a group of educational goods and services would be combined into larger, more meaningful classifications.

Major indexes are combined using the same statistical procedures as cost weights for individaul prices were combbined to form primary price indexes. Finally, the single educational price index would be computed by combining the major indexes, cost weighted for their relative contributions to the educational market basket.

## RECAPITULATION OF STATISTICAL PROCEDURES IN THE CONSTRUCTION OF AN EDUCATIONAL PRICE INDEX

As noted earlier, the economic approach has dominated the development of price index theory. This is particularly true of the Consumer Price Index. Consequently, the same approach should be followed in developing and designing an educational price index. The theorectical considerations used to analyze the effectiveness of a Consumer Price Index could also be utilized to analyze the effectiveness of a New York State Regional Cost of Education Index. The Index formula selected would be grounded in economic theory yet would still be required to meet the criteria established for an effective

price index. These criteria were defined and therefore are just enumerated at this juncture. They are Practicability, Availability of Data, Objectivity, Simplicity, and Flexibility.

The New York State Cost of Education Index would be a statistical measure of the price changes in the goods and services purchased by local districts. Data would be collected in such a way that cost weights could be assigned to items making up an educational market basket. Such data would be available not only on a State wide basis but also on a regional basis, perhaps even a county basis. The statistical procedures utilized to combine the cost weights would be the same as those utilized to combine the cost weights in the Consumer Price Index. Although there are numerous ways to develop price ratios, the Laspeyre formula, as adapted to the Consumer Price Index and discussed earlier, is the most appropriate statistical procedure for the New York State Cost of Education Index. Thus, price changes in educational goods and services would be measured from a designated reference period.

The steps involved, then, in the construction of a New York State Regional Cost of Education Index would be as follows: First, identify the various items that would comprise the educational market basket. Because of costs involved this process should involve a sample of school districts not only representative of the State as a whole but also representative of a number of specified regions in the State. Moreover, not every item that school districts purchase must be included in the educational market basket. The Consumer Price Index seeks

data on some 400 consumer items rather than the actual "million and one" items consumers actually buy. These items are cost weighted and statistically combined into primary indexes. Primary indexes are also cost weighted and combined into sub-major indexes, and sub-major indexes into major indexes into major indexes. Lastly, major indexes are statistically combined into a New York State Regional Cost of Education Index. Not only must appropriate cost weights be computed for price items and indexes but also valid surrogate measures must be selected for them. Because of costs, every attempt should be made to utilize data collected by Federal and other State agencies. Base years or base year must be selected against which all cost weights and indexes will be compared. The result would be yearly developed educational price indexes for New York State. Because of cost, little attempt should be made to develop monthly educational indexes as is done with the Consumer Price Index.

## SUMMARY OF PROBLEMS AND CONCERNS IN THE DESIGN AND DEVELOPMENT OF A NEW YORK STATE REGIONAL COST OF EDUCATION INDEX

To design, develop, process, and publish a New York State Regional Cost of Education Index would be a costly venture. Serious study must be given to the benefits to be derived from the costs incurred. Presently, neither valid educational cost data nor representative educational price data are collected. Not only must local school district personnel be assigned and

trained to collect and report school expenditures in the detail necessary, but so also must State Education Department personnel. Also provisions must be made to process such data at the State Department level.

The uses to which an educational price index could be put are many. Two State uses for an educational price index would be to adjust State aid to individual districts and to adjust the magnitude of the parameters in a foundation program. Of considerable concern to those persons stressing equality of educational opportunities is the fact that an educational price index has a tendency to adjust aid upward in wealthy as contrasted to poor districts. The result could be to further increase the expenditure level and staff ratio gaps between wealthy and poor districts. Thus, these uses of an educational price index could very well run counter to the principle of equalization of educational opportunities for all children in the State. Much study is still warranted before New York State takes the steps to implement an educational price index to adjust State aid.

# APPENDICES

APPENDIX A

THE EFFECT OF REGIONAL PRICE ADJUSTMENTS

FOR STATE AID TO LOCAL SCHOOL DISTRICTS

New York State does not presently adjust State aid to local districts for regional cost variations. Project 842 staff is engaged in a study of regional cost variations. The results of this study will probably not be available until a later date.

One procedure to adjust State aid for regional cost variations is to utilize differences in cost of living. The Federal Government presently publishes a Consumer Price Index for the New York City and Buffalo Standard Metropolitan Statistical areas. It should be remembered that an educational market basket is not identical to a family market basket. Nevertheless, with this reservation in mind, differences in cost of living between upstate and downstate New York families amount to about seven percent. This figure was used to adjust downstate New York school districts in the New York Standard Metropolitan Statistical Area. School districts in the following counties are in the area: Rockland, Westchester, Nassau, Suffolk, and New York City.

| | Districts In Sample | Total Districts |
|---|---|---|
| Rockland | 1 | 10 |
| Westchester | 5 (inc. Yonkers) | 49 (inc. Yonkers) |
| Nassau | 6 | 56 |
| Suffolk | 6 | 72 |

| | Districts In Sample | Total Districts |
|---|---|---|
| New York City | 1 | 1 |
| Total | 19 | 188 |

The amount of regional cost adjustment each district in the New York State 75 school district sample would receive was computed. Of course, the regional cost adjustment would provide State aid increases to the very school districts which have the highest expenditure level and staffing ratios. Thus, the regional cost adjustment to State aid would not be equalizing nor would it reduce the expenditure level and staffing ratio gaps.

The funds needed to adjust for regional cost variations would be substantial. An estimated $82 to $85 million would be needed, depending upon the State aid plan selected. This amount is more than half as much as the total projected aid for FY 1978-79 over FY 1977-78 for New York State school districts.

If the regional cost adjustments were to be paid for out of the projected $150 million increase in current expense operating aid (1978-79 aid over 1977-78 aid) this would have the effect of increasing the local share factor by .005 or the expenditure level ceilings by $50 per pupil. To reduce the aid ceilings would tend to hurt the poorer districts making the State aid plan less equalizing than it could or should be.

Without a detailed study investigating educational price differentials, there are few valid reasons for immediately

implementing regional price differentials in New York State at this time. While differences in cost are known, differences in educational prices are not. As indicated earlier, the cost to the State based on cost of living differentials would be too expensive -- more than half of the proposed $150 million increase recommended for FY 1978-79 would be needed. To utilize more than half of the projected increase for regional price differentials would result in a resultant State aid plan decidedly less equalizing than the present plan. Program equalization would not be furthered since neither the staffing ratio nor the expenditure level gaps would be reduced.

APPENDIX B

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PRICE INDEX STUDIES

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